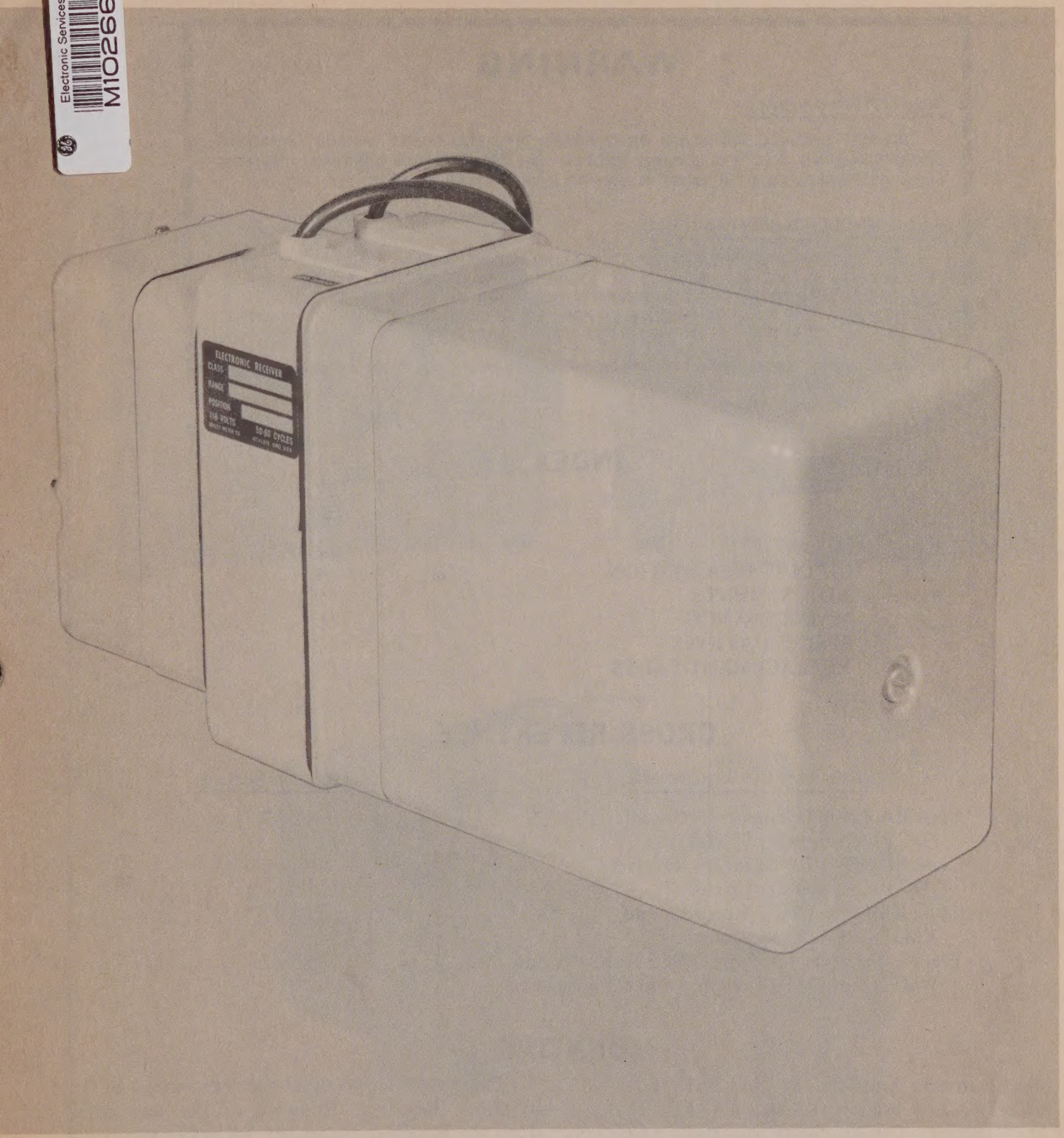
Electronic Services - Los Angeles
M10266X

Product Instructions E12-46




# Solid State DC Amplifier

Pt.No. 6618750-□

Bailey Babcock & Wilcox

## WARNING

INSTRUCTION MANUALS

DO NOT INSTALL, MAINTAIN OR OPERATE THIS EQUIPMENT WITHOUT READING, UNDERSTANDING AND FOLLOWING PROPER Bailey Babcock & Wilcox INSTRUCTIONS AND MANUALS, OTHERWISE INJURY OR DAMAGE MAY RESULT.

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MOST ELECTRONIC EQUIPMENT IS INFLUENCED BY RADIO FREQUENCY INTERFERENCE (RFI). CAUTION SHOULD BE EXERCISED WITH REGARD TO THE USE OF PORTABLE COMMUNICATIONS EQUIPMENT IN THE AREA. PRUDENT PRACTICE DICTATES THAT CAUTIONING AGAINST THE USE OF PORTABLE COMMUNICATIONS EQUIPMENT BE TAKEN BY POSTING APPROPRIATE SIGNS IN YOUR PLANT.

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## CROSS REFERENCE

| Instrument or Equipment | Instruction Section |
|---|---|
| Class EA & EB Telemeter Receivers (DC Potentiometer Circuit) | E12-77 |
| Class EF & EG Temperature Receivers (DC Potentiometer Circuit | E12-78 |
| Type KM55 or WM55 Recorder and KM53 or WM53 Indicator | E12-3 |
| Electric Receiver for Type WM55 Recorder and WM53 Indicator (Assembly and Components) | E12-42 |

## MOUNTING

The Electronic Amplifier, Pt. Nos. 6618750-1 and 6618750-2, is used with Class EA, EB, EF, and EG Receivers. The Amplifier consists of a DC power supply, converter, voltage amplifier, motor control circuit, regulated DC voltage source, and thermocouple burnout protection circuit. The voltage amplifier detects and amplifies voltage produced by unbalance in the measuring circuit. The amplified output is applied to the motor control circuit, which operates a reversing motor in the required direction to reposition a slidewire and rebalance the measuring circuit.

The Amplifier occupies the rear section of the Electrical Receiver. Removal of the rear cover from the Receiver makes the Amplifier accessible for adjustment, inspection, or repair. It is plugged into a standard tube socket in the Receiver wiring board, and is secured to the Receiver case with four captive mounting screws, as shown in Figure 1. Note the input cable from the Receiver wiring board to the terminals at the rear of the Amplifier. Disconnect the leads from these terminals before unplugging the unit.

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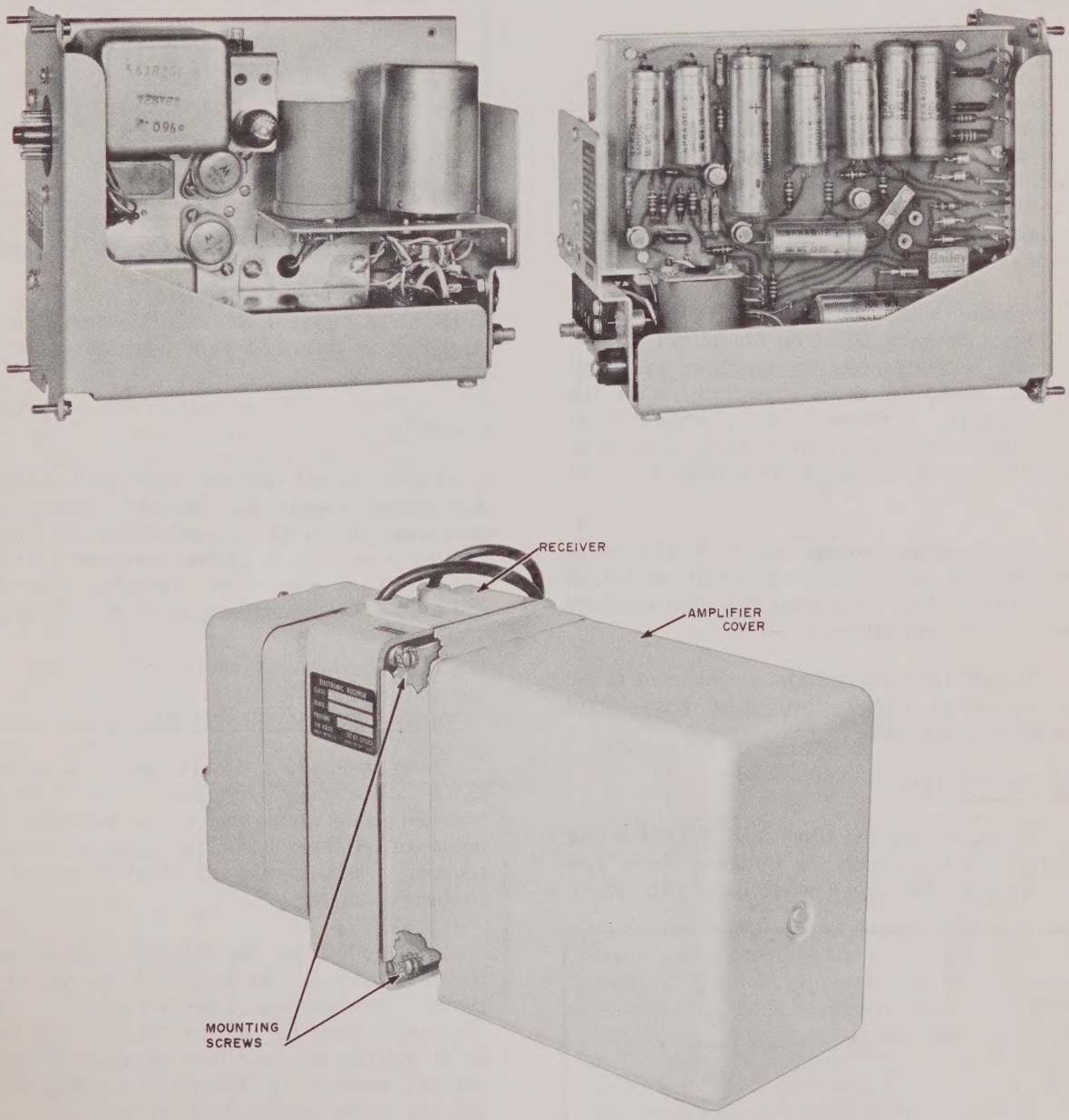



FIGURE 1 - General Assembly

# CIRCUIT DESCRIPTION

The Amplifier consists of a DC power supply, converter, four stage AC amplifier, motor control circuit, and a regulated DC voltage source. The interrelationship of these components is shown in Figure 2.

## Regulated Voltage Source

Regulated DC voltage is obtained from a rectified AC source. A full-wave rectifier, consisting of two diodes, is supplied from the secondary winding of the power supply transformer located on the chassis. The DC output voltage is filtered and regulated by a Zener diode reference circuit as shown in Figure 3.

Normal variations in line voltage and frequency have no effect on the output voltage. In order to compensate for variations in output voltage caused by aging characteristics of the Zener diode, a rheostat, R29, and a fixed precision resistor, R28, are connected in series with the output voltage from the Zener reference circuit.

The regulated voltage source is adjusted to standard cell voltage, between 1.0189 and 1.0194 volts. Instructions for making this adjustment are given under "Adjustments".

The DC regulated voltage is connected to the potentiometer circuit thru plug and socket connectors pins 4 and 5.

## DC Power Supply

DC power for the three-stage Amplifier and motor control circuit is obtained from two full-wave rectifiers, each consisting of two diodes,

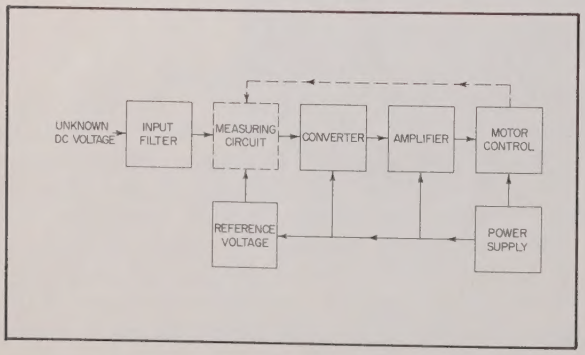



FIGURE 2 - Block Diagram of Amplifier

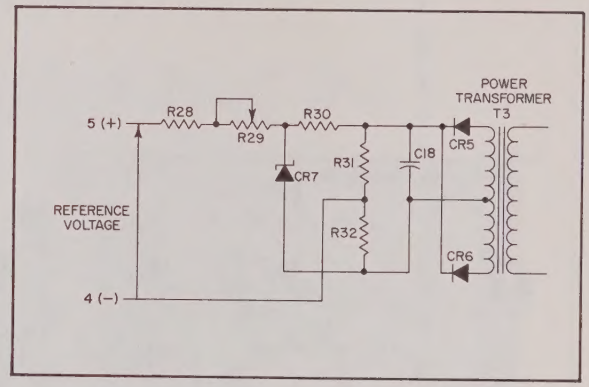



FIGURE 3 - Schematic of Regulated Voltage Source

as shown in Figure 4. Smooth DC voltage for the Amplifier is provided thru capacitor-resistance filters.

## Converter

Two types of converters are used with the Amplifier. Converter Part No. 1941700-1 is used with Amplifier Part No. 6618750-1 for inputs ranging from 2 mv to 25 mv. Converter Part No. 6618300-1 is used with Amplifier Part No. 6618750-2 for inputs ranging from 25.1 mv to 100 mv.

## Converter for Amplifier Part No. 6618750-1

Refer to Figure 5. The DC unbalance voltage, $e_b$, is connected to terminals 1 and 3 on the terminal board at the rear of the Amplifier. The input voltage from the DC pickup is connected to terminal 1 and then to the vibrating reed of the chopper converter.

The input from the slidewire potentiometer circuit is connected to terminal 3 and then to the center tapped primary of the step-up transformer. The output from the step-up transformer is, then, an AC voltage, the magnitude and phase of which, depend, respectively, upon the magnitude and polarity of the unbalance voltage, $e_b$.

The converter housing is dust-proof. Connections are made thru a six-prong socket to the chassis. A defective converter can be identified by scattered periods of erratic pen motion.

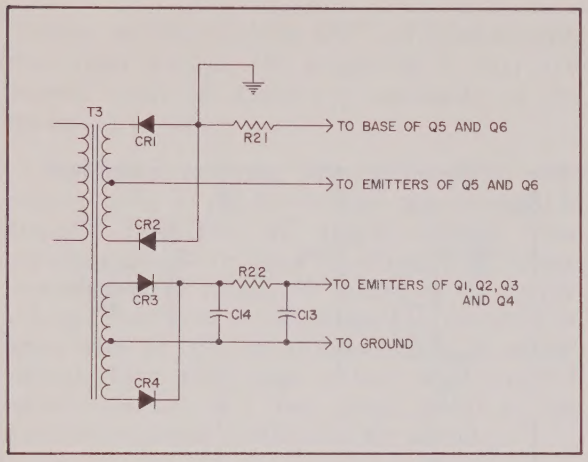



FIGURE 4 - Schematic of DC Power Supply

## Converter for Amplifier Part No. 6618750-2

Refer to Figure 6. The DC unbalance voltage, $e_b$, is connected to terminals 1 and 3 on the terminal board at the rear of the Amplifier. The driving transformer connected to pins 1, 2, and 6 turns the transistors on and off, chopping the input signal; the output from the step-up transformer is an AC voltage, the magnitude and phase of which depend upon the magnitude and polarity of the voltage $e_b$.

## Amplifier

The amplifier, shown schematically in Figure 7, consists of four stages of resistance-coupled amplification, with series feedback between the stages to provide a stable gain. Four transistors

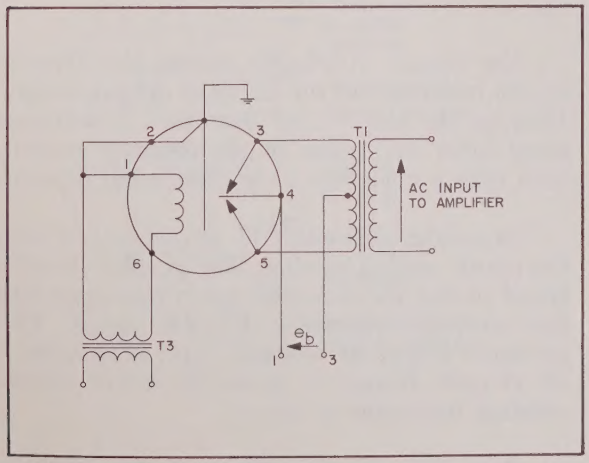



FIGURE 5 - Schematic of Converter, Pt. No. 1941700-1

are employed. At balance condition, when the input EMF equals the balance back voltage of the measuring circuit, the input voltage to the amplifier is zero. Under this condition, the first stage transistor, Q1, passes a steady DC collector current which is determined by the characteristics of the transistor and by the values of DC voltage and collector resistors.

A change in the measured variable produces an AC input to the amplifier from the converter. This input is applied to the base of the first stage transistor. Since this voltage is alternately positive and negative, it causes corresponding variations in the collector current. These variations in collector current cause an AC voltage drop to be superimposed on the existing DC voltage drop thru resistor R3 in the collector circuit.

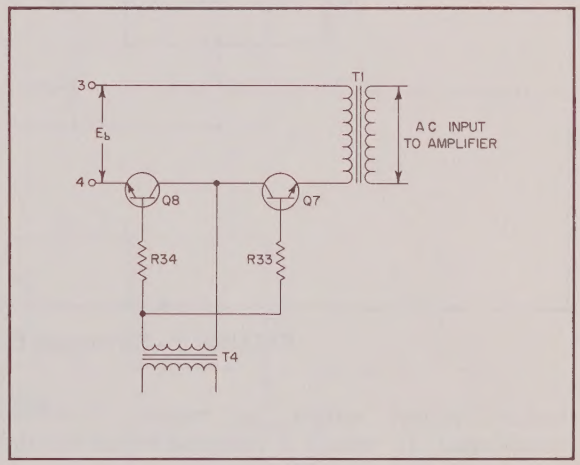



FIGURE 6 - Schematic of Converter, Pt. No. 6618300-1

The output from the first stage of amplification is applied to the base of the second stage transistor, Q2, where it is further amplified and appears as an output across the second stage resistor R6. This output is then applied to the base of the third stage transistor, Q3, where it is amplified again and appears as an output voltage across resistor R11. Blocking capacitor C6, passes only the AC component of the collector voltage. This voltage is applied across the sensitivity adjustment potentiometer (gain adjustment) R13. The potentiometer setting determines the portion of the voltage drop across R1 applied to the base of the driver stage transistor, Q4.

The output voltage of the amplifier circuit driver stage is coupled to the power stage of the

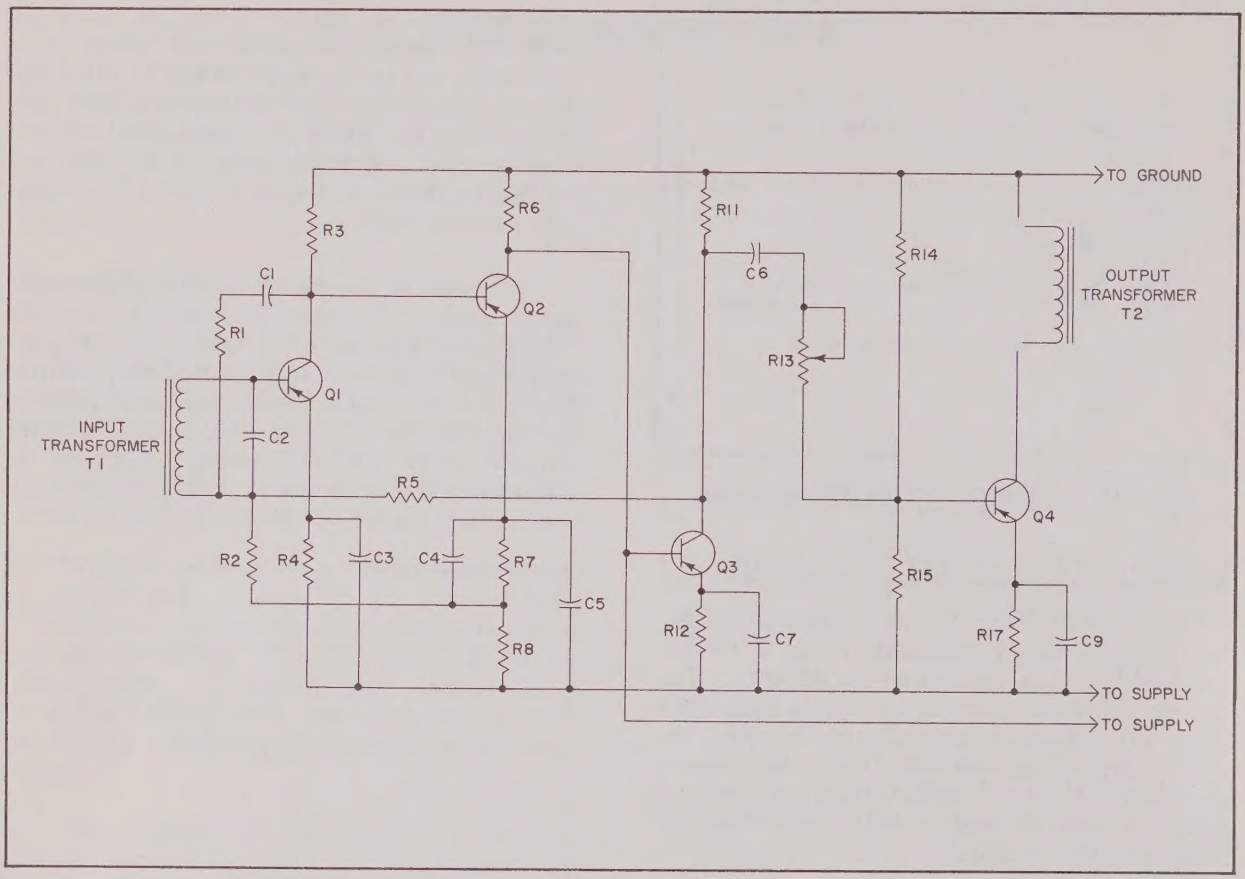



FIGURE 7 - Schematic Diagram of Four Stage AC Amplifier

motor control circuit by means of driver transformer T2 which is designed to match the impedance of the amplifier circuit.

Motor Control Circuit

The motor control circuit, shown schematically in Figure 8, controls the speed and direction of rotation of the reversing motor. The motor control transistors, Q5 and Q6, are connected in a push-pull configuration to control the power to the center-tapped control winding of the motor.

When the measuring circuit is balanced, the AC base voltage is zero and collector current thru the motor control transistors is full-wave rectified DC. When the measuring circuit is unbalanced (on an increase or decrease in the measured variable), the 60 cycle base voltage signal modifies the current thru the transistors by cutting off collector current during half of the cycle. The half cycle of collector current that is cut off depends on the phase of the amplifier output voltage, which in turn, depends on the direction of unbalance of the measuring circuit. Note in Figure 8 the $i_C$ curves for an increase and a decrease in measured variable.

The change in collector current also depends on the magnitude of the amplifier output voltage. Thus as the base voltage decreases, it decreases every other half cycle of the collector current, until only a small 120 cycle component remains.

Capacitors C10 and C11 are in parallel with the motor control winding. The parallel circuit is tuned so that the capacitors are in resonance with the winding inductance for 60 cycles. This produces a large AC voltage, $E_{M1}$, at unbalance, of 60 cycle frequency across the motor control winding, improving sensitivity.

Depending on the phase of the amplifier voltage output, as explained above, the phase of voltage $E_{M1}$ across the motor control winding $W_C$

is either in phase with or 180° out of phase with the supply voltage. The magnitude of $E_{M1}$ will depend upon the amount of unbalance of the measuring circuit.

Reference winding $W_P$ is supplied with current thru a phase shifting capacitor, C12, directly from the AC supply voltage. This capacitor causes the phase of voltage $E_{M2}$, across winding $W_P$, to almost 90° ahead of the supply voltage. Therefore, since voltage $E_{M1}$ is either in phase with or 180° out of phase with the supply voltage, $E_{M2}$ either lags or leads $E_{M1}$ and the motor operates as a two phase motor in the direction required to rebalance the circuit.

## Thermocouple Burnout Protection

Refer to Figure 9. Bias voltage has been added to the base of stage three of the Amplifier, so that in the event of thermocouple burnout the pen is moved to 100% or 0% chart. This makes the burnout immediately evident, operating high temperature alarms if installed, and avoiding the results of a false reading.

NOTE: The insertion of the bias causes a 2% pen position shift to the original calibration. Therefore, the position link must be placed in the desired position before calibration.

The position link appears on the PC board (see Figure 1). The link has three positions: "U" for up scale, "D" for down scale and "None". The bias link is placed in the up scale drive position at the factory and calibrated. If the link position is changed in the field, recalibration must be performed.

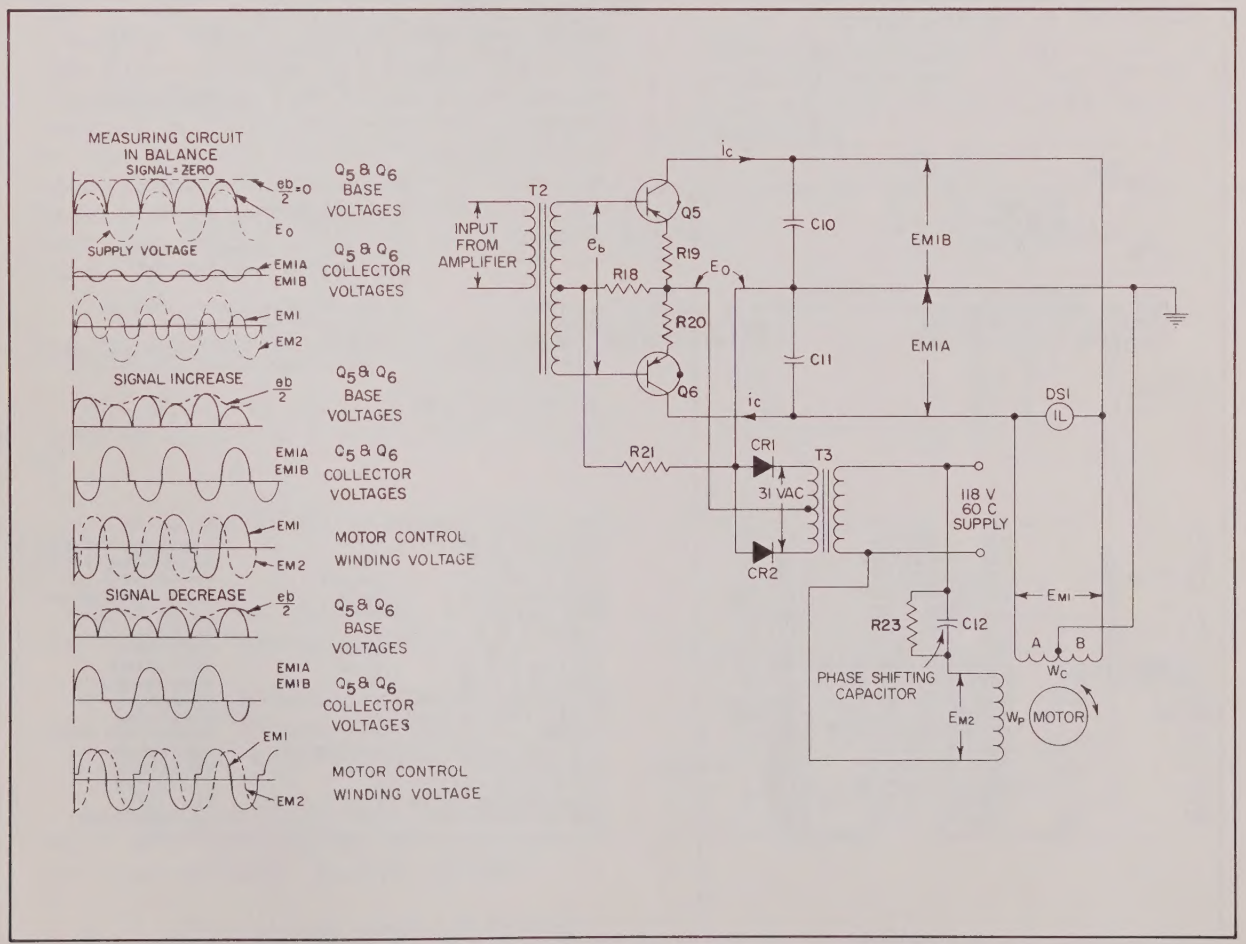
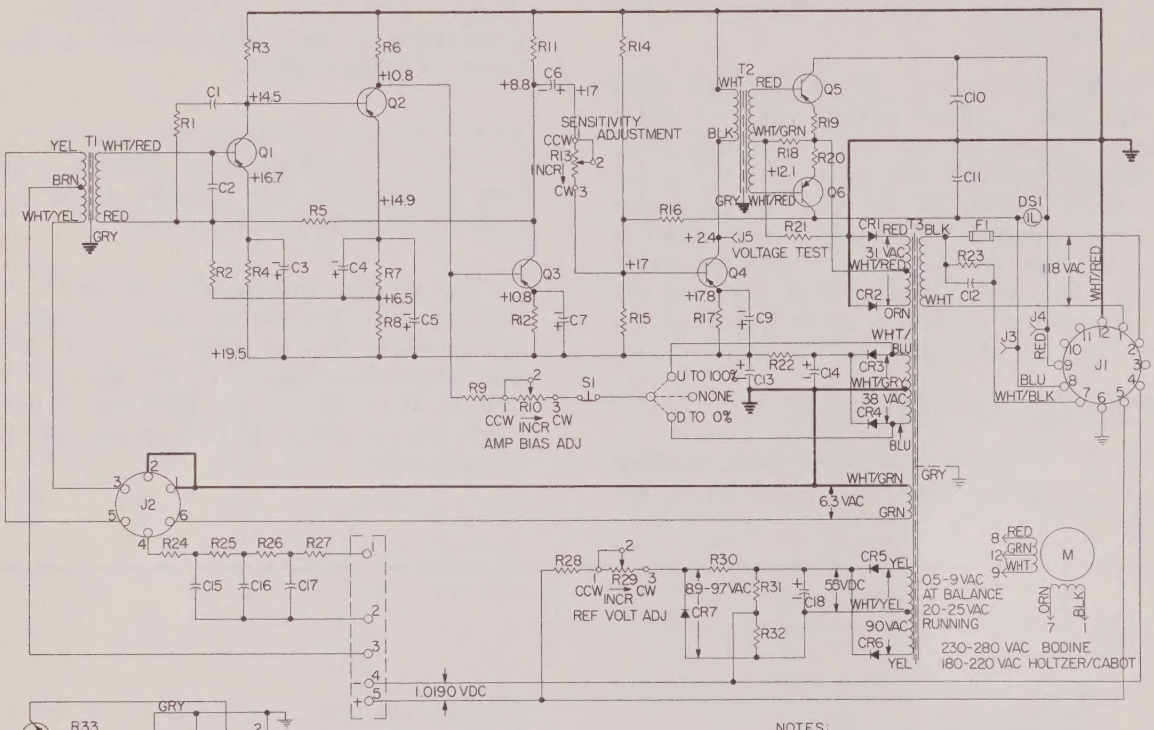



FIGURE 8 - Schematic Diagram of Motor Control Circuit




MT2
PART NO. 6618300-1 USED WITH AMPLIFIER PART NO. 6618750-2 FOR RANGES FROM 25MV TO 20V

MT1
PART NO. 1941700-1 USED WITH AMPLIFIER PART NO. 6618750-1 FOR RANGES FROM 5MV TO 25MV

NOTES:
HEAVY LINE — INDICATES GROUND

DC VOLTAGES (POLARITY MARKED) ARE WITH RESPECT TO GROUND...

DC VOLTAGE MEASUREMENTS MADE ON SCALE HAVING 100,000 OHMS/VOLT RESISTANCE...

AC VOLTAGE MEASUREMENTS MADE ON SCALE HAVING 5000 OHMS/VOLT RESISTANCE...

| | | | | | |
|---|---|---|---|---|---|
| C1 | CAP. .01MFD 50V | R8 | RES 2.8K 1/2W 1% | R31 | RES 24.9K 3W 1%WW |
| C2 | CAP. .068MFD 50V | R9 | RES 33K 1/2W 5% | R32 | RES 85 OHMS 1W 1%WW |
| C3, C4, C9 | CAP. 500MFD 15V | R10 | POT. 2.5MEG 30% | R33, R34 | RES 499 OHMS 1/2W 1% |
| C5 | CAP. 2000MFD 15V | R11, R12 | RES 6.8K 1/2W 5% | CR1-6 | DIODE 1N3193/SM-120 |
| C6, C7 | CAP. 500MFD 15V | R13 | POT. 250K 30% | CR7 | ZENER DIO 1N2621 |
| C10, C11 | CAP. 25MFD 50V N.P. | R14 | RES 22K 1/2W 5% | Q1 | TSTR 2N1185 |
| C12 | CAP. .6MFD 330V | R15 | RES 3.3K 1/2W 5% | Q2, Q3, Q4 | TSTR 2N466 |
| C13, C14 | CAP. DUAL 500MFD 25V | R16 | RES 620K 1/2W 5% | Q5, Q6 | TSTR 2N376A |
| C15, C16, C17 | CAP. 12MFD 25V | R17 | RES 2.4K 1/2W 5% | Q7, Q8 | TSTR RCA #36470 |
| C18 | CAP. 100MFD 100V | R18 | RES 2.7 OHMS 1/2W 5% | T1, T2, T3, T4 | TRANSFORMER |
| R1, R22 | RES 1K 1/2W 5% | R19, R20 | RES 4.02 OHMS 3W 1%WW | F1 | FUSE 1 AMP |
| R2 | RES 470 OHMS 1/2W 5% | R21 | RES 220 OHMS 3W 1% | S1 | PUSHBUTTON SWITCH |
| R3 | RES 28K 1/2W 1% | R23 | RES 100K 1/2W 5% | MT1, MT2 | CONVERTER |
| R4 | RES 5.62K 1/2W 1% | R24, R25, R26, R27 | RES 2K 1/2W 5% | J1 | AMPLIFIER PLUG |
| R5 | RES 1 MEG 1/2W 5% | R28 | RES 3.75K 1W 1%WW | J2 | 6 PIN SOCKET |
| R6 | RES 11K 1/2W 1% | R29 | TRIMPOT 500 OHMS .8W | J3, J4, J5 | TEST JACK |
| R7 | RES 1.8K 1/2W 5% | R30 | RES 4.3K 1W 1%WW | DS1 | INDICATOR LIGHT |

FIGURE 9 - Schematic Diagram of Complete Amplifier

# ADJUSTMENTS

These adjustments should be made in conjunction with the complete calibration of Class EA, EB, EF, or EG Receivers mounted in a Type WM Recorder. Follow the step-by-step instructions outlined under "Adjustments and Calibration" in the instruction section covering the particular class of Receiver (see "Cross References"), and make the adjustments described below when recommended in the applicable instruction section.

Adjustments to the Amplifier are made at the rear of the chassis, with the Amplifier cover removed. See Figure 10.

## Sensitivity Adjustment

The Amplifier is furnished with an indicating light in parallel with the motor control winding, as shown in Figure 9. The light is lit when the 60 cycle component of the voltage across the motor control winding is large enough to operate the motor. With the Receiver measuring a steady variable, turn the sensitivity adjustment shaft clockwise until the indicating light lights or flashes and the motor oscillates. Then turn the shaft counterclockwise until the oscillation stops and the light remains dim or out.

## Thermocouple Burnout Protection Adjustment

This adjustment must be made before the sensitivity adjustment is made. Refer to Figure 10.

1. Adjust input until pen is approximately at 50% of range.

2. Depress bias pushbutton S1 and note position of pen, then release button.

3. If position of pen in step 2 does not deviate 2% from pen position in step 1, turn bias adjustment screw until deviation in step 2 is 2%.

4. Open input leads and check for proper motor drive and direction. If motor drive or direction is not correct, recheck Amplifier.

5. 2% calibration shift introduced by thermocouple burnout protection adjustment is corrected by resetting pen linkage zero adjustment.

## Reference Voltage Adjustment

The reference voltage adjustment trimmer is shown in Figure 10. Ordinarily this adjustment is made by turning the shaft until the pen reading agrees with a known calibrated reference input signal to the Receiver.

However, to set the reference voltage equal to a standard cell, proceed as follows:

1. Disconnect three-wire connecting cable from terminals 1, 2, and 3 at rear of Amplifier chassis.

2. Connect positive lead of standard cell to terminal 5, and negative lead to terminal 1. Place a jumper between terminals 3 and 4.

3. If reference voltage is incorrectly set, slidewire reversing motor will operate in one direction or other, and indicating light will light. Readjust reference voltage until light dims or goes out.

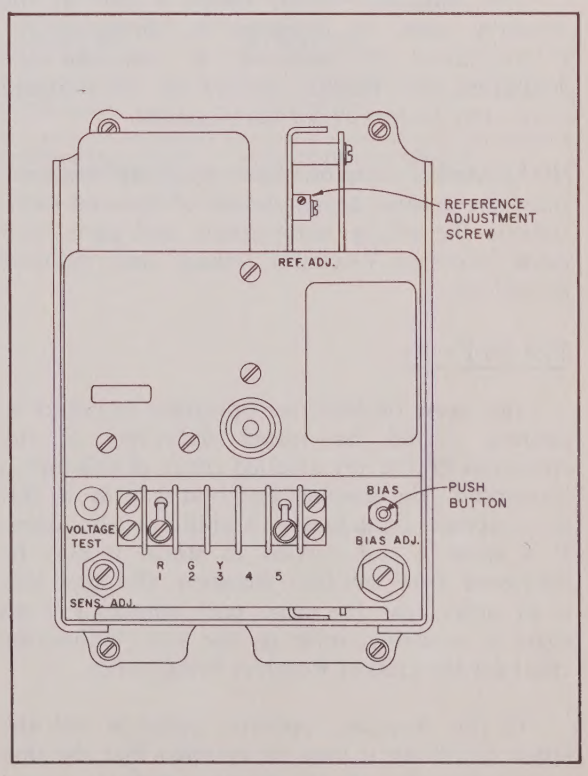



FIGURE 10 - Amplifier Adjustments

# MAINTENANCE

## Voltage and Frequency Variations

The Electronic Amplifier is designed to operate from a 118 volt 60 cycle supply. Line voltage variations from 107 volts to 127 volts and frequency variations from 58 to 62 cycles per second will have no serious effects on accuracy and sensitivity.

Line voltage below 107 volts will result in loss of sensitivity and may cause sluggish operation of the reversing motor.

Line voltage above 127 volts may cause excessive heating in the Amplifier and in the reversing motor, particularly when the unit is subjected to high ambient temperatures.

## Dusty and Damp Locations

The Amplifier cover, which is part of the Receiver case, is designed to minimize the accumulation of moisture or dust on the Amplifier. No trouble should be encountered from these factors in normal locations.

NOTE: Avoid damp or extremely dusty locations, since the gradual accumulation of dirt and moisture on the wiring, connections, and parts, may cause excessive electrical leakage and eventual breakdown.

## Test for Faults

The cause of defective operation or failure to operate should be traced definitely to the Amplifier before any detailed check of this unit is attempted. The simplest and best way to do this is to replace the defective Amplifier with a spare. If a spare is not carried in stock, it may be borrowed from another Receiver. (Be sure that both units bear the same part number.) If no spare is available, refer to the trouble-shooting chart for the class of Receiver being tested.

If the Receiver operates properly with the spare Amplifier, it may be assumed that the first unit is defective. If the Receiver fails to operate with a spare that is known to be in good condition, it indicates that the source of trouble is elsewhere, and that the Receiver and external wiring should be checked.

## Inspection and Operational Checks

Refer to Figure 11.

Check the 1-amp fuse located next to the motor control test jacks.

Check the transistors in the defective Amplifier by replacing them one by one with transistors that are known to be operating properly.

If these checks do not reveal the source of the trouble, remove the Amplifier from the back of the Receiver case and remove the base plate. Check for shorts between prongs of the transistor sockets, broken connections to these sockets, broken wires, etc.

Excessive heating of the power supply transformer, as indicated by melting of the encapsulating compound, indicates a defective transformer, a short or ground in the wiring, or a shorted filter capacitor.

Unless the source of trouble indicated by these symptoms is in the external wiring or in the transistor socket connections and can be repaired easily, the entire unit should be returned to the factory.

## Circuit Checks

Circuit voltage checks which should locate any trouble in the Amplifier are given in Figure 9. A volt-ohm-meter and a 12-wire cable having suitable plugs at each end are required. The cable permits operation of the Amplifier when removed from the Receiver. The test meter should be a multirange type, suitable for measuring both AC and DC. It must also have an internal resistance of at least 100,000 ohms/volt for DC measurements and 5,000 ohms/volt for AC measurements.

# MAINTENANCE

Make the measurements indicated and check resistance values as given in Figure 9. Refer to the Fault Location Chart for an indication of the probable fault. If these tests indicate a defective Amplifier that cannot be repaired simply by replacing a transistor or capacitor assembly or by repairing a connection, the Amplifier should be returned to the factory for repair.

## Routine Maintenance

Avoid operating the unit in locations with temperatures in excess of 120F. Operation at higher ambient temperatures will damage the insulation and eventually cause breakdown.

FAULT LOCATION CHART

| MEASURING POINT TO GROUND | PROBABLE FAULT | MEASURING POINT TO GROUND | PROBABLE FAULT |
|---|---|---|---|
| JCT OF C1 & Q1 COLLECTOR.<br>VOLTAGE IS LOW.<br>VOLTAGE IS HIGH. | Q1, Q2, Q4 DEFECTIVE. C1 SHORTED.<br>Q1, Q2, Q3 DEFECTIVE. C3, C4, C5, C6, C9 SHORTED. | JCT OF R17 & Q4 EMITTER.<br>VOLTAGE IS LOW.<br>VOLTAGE IS HIGH. | Q3, Q4 DEFECTIVE. C6, C9 SHORTED.<br>Q4 DEFECTIVE. |
| JCT OF R4 & Q1 EMITTER.<br>VOLTAGE IS LOW.<br>VOLTAGE IS HIGH. | Q1, Q3, Q4 DEFECTIVE. C1, C9 SHORTED.<br>Q1, Q2 DEFECTIVE. C3, C5, C7 SHORTED. | VOLTAGE TEST JACK 5.<br>VOLTAGE IS LOW.<br>VOLTAGE IS HIGH. | Q4 DEFECTIVE. C1, C7 SHORTED.<br>Q4 DEFECTIVE. C6, C9 SHORTED. |
| JCT OF R6 & Q2 COLLECTOR.<br>VOLTAGE IS LOW.<br>VOLTAGE IS HIGH. | Q1, Q2, Q4 DEFECTIVE. C1, C3, C9 SHORTED.<br>Q1, Q2, Q3 DEFECTIVE. C4, C5, C6, C7 SHORTED. | JCT OF R13 & C6<br>VOLTAGE IS HIGH. | Q1 DEFECTIVE |
| JCT OF R7 & Q2 EMITTER.<br>VOLTAGE IS LOW.<br>VOLTAGE IS HIGH. | Q2, Q3, Q4 DEFECTIVE. C1, C6, C9 SHORTED.<br>Q1, Q3 DEFECTIVE. C3, C4, C5, C7 SHORTED. | JCT OF R8 & C3<br>VOLTAGE IS LOW.<br>VOLTAGE IS HIGH. | C7 SHORTED.<br>Q1, Q4 DEFECTIVE. |
| JCT OF R12 & Q3 EMITTER.<br>VOLTAGE IS LOW.<br>VOLTAGE IS HIGH. | Q1, Q2, Q3, Q4 DEFECTIVE. C1, C3, C9 SHORTED.<br>Q1, Q4 DEFECTIVE. C4, C5, C7 SHORTED. | JCT OF R7 & C4<br>VOLTAGE IS LOW.<br>VOLTAGE IS HIGH. | Q2 DEFECTIVE.<br>Q1, Q2 DEFECTIVE. |
| JCT OF R11 & Q3 COLLECTOR.<br>VOLTAGE IS LOW.<br>VOLTAGE IS HIGH. | Q1, Q2, Q3 DEFECTIVE. C5, C9 SHORTED.<br>Q1 DEFECTIVE. C6 SHORTED. | ALL POINTS.<br>VOLTAGE IS LOW. | CR3, CR4 DEFECTIVE. C13, C14 SHORTED.<br>T3 DEFECTIVE. |
| JCT OF R15 & Q4 BASE.<br>VOLTAGE IS LOW.<br>VOLTAGE IS HIGH. | C6 SHORTED.<br>Q2, Q4 DEFECTIVE. | MOTOR RUNS TO 0% CHART.<br>MOTOR RUNS TO 100% CHART. | Q2 DEFECTIVE. C1 SHORTED.<br>Q2, Q3 DEFECTIVE. C2 SHORTED. |

# SPECIFICATIONS

| | |
|---|---|
| **Input Ranges** | See Table I |
| **Ambient Temperature** | 40-140F |
| **Power Supply Requirements** | 107-127v AC, 48-62 Hz |
| **DC Supply to Reference Circuit** | 1.0190v DC |

SPECIFICATIONS SUBJECT TO CHANGE WITHOUT NOTICE

| Amp. Pt. No. | Description | Min. Amp. Input to Cause Servomotor Rotation | Class E Receiver Input Voltage Level |
|---|---|---|---|
| 6618750-1 | Mech. Chopper | 2.0 Microvolts | 2-25 Millivolts |
| 6618750-2 | SS Chopper | 4.0 Microvolts | 25.1-100 Millivolts |

TABLE I - Basic Amplifier Variations

# REPLACEMENT PARTS

Recommendations of parts that should be stocked for these units are made in Instruction Sections E12-77 and E12-78.

Figure 11 is a Parts Drawing for the Electronic Amplifier, Part Numbers 6618750-1 and 6618750-2. This drawing normally will apply to Amplifiers bearing these part numbers. However, there may be individual differences in specific units because of:

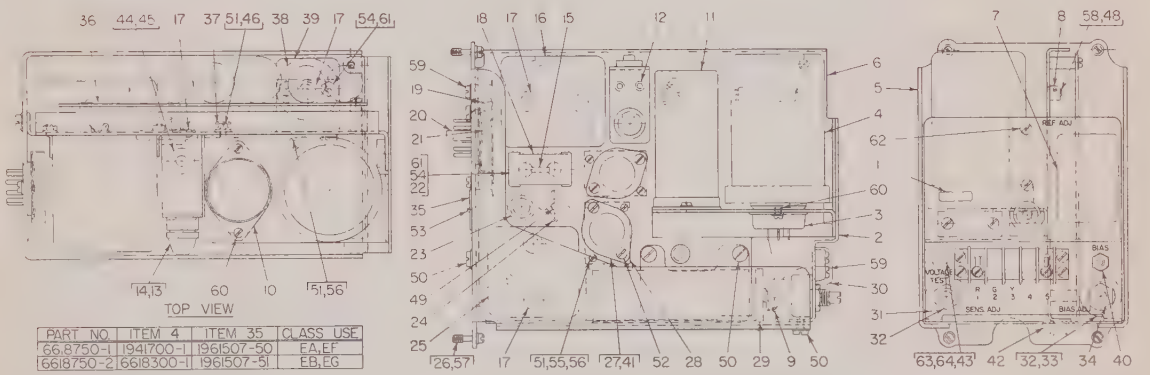
a. Design changes made since the printing of this Instruction Section.

b. Special design of the Amplifier furnished, to make it suitable for a special application.

Therefore, when ordering parts, assure correct replacements for the Amplifier by specifying on the order:

1. Amplifier Part Number and Code Number, and the Class of Electrical Receiver in which it is mounted.

2. The Parts Drawing on which each part is illustrated. (The Parts Drawing Number is given in the title for the Figure.)




| PART NO. | ITEM 4 | ITEM 35 | CLASS USE |
|---|---|---|---|
| 6618750-1 | 1941700-1 | 1961507-50 | EA,EF |
| 6618750-2 | 6618300-1 | 1961507-51 | EB,EG |

| ITEM | PART NO. | NAME |
|---|---|---|
| 1 | SEE NOTE | CODE LABEL |
| 2 | 6618754-1 | END PLATE |
| 3 | 1941713-1 | SOCKET |
| 4 | SEE TABLE | CONVERTER |
| 5 | 6618759-1 | FRAME ASSEMBLY |
| 6 | 6618752-1 | CHASSIS ASSEMBLY |
| 7 | 1961072-1 | INSTRUCTION LABEL |
| 8 | 1942530-5 | TRIMMER |
| 9 | 194841-6 | RESISTOR, 4 REQD |
| 10 | 69026-1 | MOUNTING RING |
| 11 | 1943209-1 | CAPACITOR |
| 12 | 1942826-1 | TEST JACK, 2 REQD |
| 13 | 1941504-1 | FUSE EXTERNAL POST |
| 14 | 194776-11001 | 1 AMPERE FUSE |
| 15 | 194841-24 | RESISTOR |
| 16 | 6618705-1 | POWER TRANS. ASSEMBLY |
| 17 | 67125-3 | GROMMET, 7 REQD |
| 18 | 1941160-2 | PYRANOL CAPACITOR |
| 19 | 667182-1 | PLUG MTG. CUP ASSEMBLY |
| 20 | 194963-4 | PLUG |
| 21 | 194965-1 | RETAINING RING |
| 22 | 6610432-1 | BRACKET |
| 23 | 67125-2 | GROMMET |
| 24 | 6612573-1 | GROUND TERMINAL, 2 REQD |
| 25 | 6618703-1 | DRIVER TRANS. ASSEMBLY |
| 26 | 666719-1 | MOUNTING SCREW, 4 REQD |
| 27 | 1943206-1 | TRANSISTOR, 2 REQD |
| 28 | 1943177-1 | TRANS. SOCKET, 2 REQD |
| 29 | 6612554-1 | CAPACITOR |
| 30 | 1941515-2 | TERMINAL STRIP |
| 31 | 1942153-2 | POTENTIOMETER |
| 32 | 197249-1 | WASHER LOCKNUT, 2 REQD |
| 33 | 1942153-3 | POTENTIOMETER |
| 34 | 1942329-1 | SHAFT LOCK |
| 35 | SEE TABLE | NAMEPLATE |
| 36 | 6618661-1 | COMPONENT BD ASSEMBLY |
| 37 | 1943187-3 | CABLE CLIP |
| 38 | 6616365-1 | INPUT TRANS. |
| 39 | 6612415-1 | MOUNTING BRACKET |
| 40 | 6616375-2 | PUSHBUTTON |
| 41 | 1943290-1 | INSULATING WASHER, 2 REQD |
| 42 | 197240-1 | CABLE CLIP |
| 43 | 1941503-1 | TEST JACK |
| 44 | 1944298-1 | SOCKET |
| 45 | 1944297-1 | INDICATOR LAMP |
| 46 | 4 | STL FLAT WASHER |
| 48 | 1202-00 | STL SHKPF LOCKWASHER, 2 REQD |
| 49 | 3-48x3/16 | PAN HEAD EXT. SEMS |
| 50 | 10-32x1/4 | PAN HEAD SCREW, 6 REQD |
| 51 | 4-40x1/4 | PAN HEAD SCREW, 6 REQD |
| 52 | 6-32x1/2 | PN HD STL THD FRMG TYPE B, 4 REQD |
| 53 | 0 | RD HD STL THD FRMG SCR TYPE U, 2 REQD |
| 54 | 6-32 | HEX NUT, 8 REQD |
| 55 | 4-40 | HEX NUT, 4 REQD |
| 56 | 1104-00 | SHKPF LOCKWASHER, 6 REQD |
| 57 | 1106 | SHKPF LOCKWASHER, 4 REQD |
| 58 | 2-56x3/8 | PAN HEAD SCREW, 2 REQD |
| 59 | 6-32x3/8 | PAN HEAD EXT. SEMS, 6 REQD |
| 60 | 4-40x3/16 | PAN HEAD EXT. SEMS, 6 REQD |
| 61 | 1106-00 | SHKPF LOCKWASHER, 8 REQD |
| 62 | 6-32x3/16 | PAN HEAD EXT. SEMS, 4 REQD |
| 63 | 1214 00 | STL SHKPF LOCKWASHER, 2 REQD |
| 64 | 197449-1 | 1 4-20 HEX NUT |

NOTE: SPECIFY NUMBER ON LABEL WHEN ORDERING PARTS.

FIGURE 11 - Parts Drawing E12-69, Amplifier Pt. No. 6618750-□

## Product Warranty

Bailey Meter Company warrants the products manufactured by it to be free from defects in material and workmanship and will repair or replace, at its option, free of charge, f.o.b. its factory, such part or parts which prove defective within one year from date of shipment. In respect to any products which are not an integral part of a product manufactured by the Company, the warranty given by the manufacturer thereof shall apply.

## Shipping Damage

We strongly recommend that you inspect and test your instrument as soon as you receive it. If the instrument is damaged or operates improperly, notify the carrier for inspection of the shipment. The carrier's claim agent will prepare a report of damage, a copy of which should be forwarded to your nearest Bailey District Office (see back cover for location). The District Office will then tell you how to have the instrument repaired or replaced.

## Service

The Bailey Meter Company is vitally concerned that your Bailey instrument provides continued, fine performance. This instruction manual is designed to fully describe the correct installation, operation, and maintenance of your instrument under recommended conditions. If the need arises, factory-trained Service Engineers are on call for prompt, in-plant maintenance. Telephone or wire your nearby Bailey District Office to make arrangements for this service (see back cover for location and telephone number).

## Replacement Parts and Supplies

Complete parts drawings and recommended spare parts kit information are included in this instruction manual. When replacement parts or supplies are required for maintenance of your Bailey instrument, contact your nearest Bailey District Office (see back cover for location). Always specify complete data on the instrument nameplate on your inquiry or order for parts. Common parts are available for shipment within 48 hours on a speed-order basis.

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